IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	ROBERTS	Examiner:	K. NGUYEN
Serial No.:	09/835,040	Group Art Unit:	2629
Filed:	NOVEMBER 27, 2002	Docket No.:	56700US002
Title:	METHOD AND APPARATUS FOR FORCE-BASED TOUCH INPUT		

BRIEF ON APPEAL

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the final Office Action dated July 20, 2007, which finally rejected all pending claims 111-164.

A Notice of Appeal was electronically filed on October 30, 2007, and was received at the USPTO on the same date. This brief is therefore believed to be timely submitted. A Pre-Appeal Brief Request for Review was filed on October 22, 2007. A Notice of Panel Decision from Pre-Appeal Brief Review in which the panel maintained the rejection of claims 111-164 was mailed on January 4, 2008.

The fee required under 37 CFR § 41.20(b)(2) for filing an appeal brief should be charged to Deposit Account No. 13-2725.

Appellants request the opportunity for a personal appearance before the Board of Appeals to argue the issues of this appeal. The fee for the personal appearance will be timely paid upon receipt of the Examiner's Answer

REAL PARTY IN INTEREST

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellant, the Appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal for the above-referenced patent application.

STATUS OF CLAIMS

Claims 111-164 are pending and are the subject of this Appeal (Appendix 1, Claims). Claims 111 and 140 are independent claims.

Claims 111-164 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over Frisch et al. (U.S. 5,854,625) in view of Figie et al. (U.S. 5,872,561).

STATUS OF AMENDMENTS

No amendments to the application have been presented since the final Office Action mailed on July 20, 2007.

SUMMARY OF CLAIMED SUBJECT MATTER

Appellant's invention relates to a force sensor for sensing a touch force applied to a touch surface of a force sensitive touch device. Force sensitive touch devices typically include a touch surface for receiving a touch input, a frame or substrate that supports the touch surface, and some type of sensor typically positioned between the touch surface and the frame or substrate that senses touch forces applied to the touch surface. Some force sensitive touch devices include a spring or other type of biasing member that helps maintain the touch surface in a rest state relative to the frame or substrate and couples the touch surface to the frame or substrate. The sensors measure movement of the touch surface against the biasing forces of the spring. Feedback from the sensors is used to determine a location of a touch input to the touch surface.

Independent claim 111 recites "a first element including a first capacitor plate at least a portion of which is an elastic element that allows the first capacitor plate to move." Independent claim 140 recites "a first capacitor plate having an elastic element portion, the elastic element portion defining an integral elevated feature of the first capacitor plate." The "first capacitor plate" of claims 111 and 146 corresponds to, for example, the principal element 106c shown in Figure 11 and described at pages 36-38 of the present application (see Illustration A below). The "elastic element" portion of the capacitor plate corresponds to, for example, that portion of the principal element 106c that extends between clamping points 1101, 1103 where the principal element 106c is secured to a support 105 via lands 113. The "elastic element" portion of the principal element 106c provides movement of a portion of the principal element 106 while other portions of the principal element 106c remain fixed relative to the support 105.

Claims 111, 140 also recite "a second capacitor plate opposed to the first capacitor plate," which corresponds to, for example, the second capacitor plate or land 114 shown in Figure 11. A perpendicular force applied to the principal element 106c via, for example, a coupling 121c will deflect the element 106c toward the second capacitor plate 114 to provide "transmission of at least part of the touch force through the elastic element portion contributes to a change in capacitance between the first capacitor plate and the second capacitor plate," as further recited by claims 111, 140.

Illustration A: Figure 11 of the Present Application

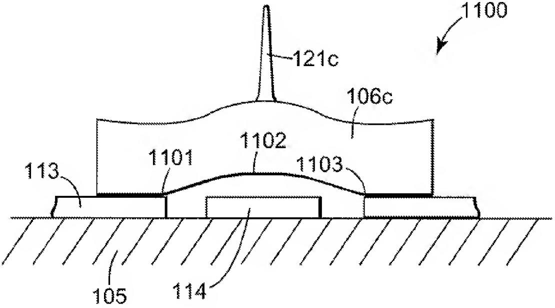

Fig. 11

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 111-164 have been finally rejected under 35 U.S.C. §103(a) as being unpatentable over Frisch et al. (U.S. 5,854,625) in view of Figie et al. (U.S. 5,872,561).

The issue presented for review:

1. Whether claims 111-164 are patentably nonobvious over Frisch in view of Figie.

The claims are contained in Appendix I.

ARGUMENT

A. Claims 111-164 are patentable over Frisch in view of Figie.

1. Introduction

Claims 111-164 have been finally rejected under 35 U.S.C. §103(a) as being unpatentable over Frisch et al. (U.S. 5,854,625) in view of Figie et al. (U.S. 5,872,561). Appellant respectfully submits that the rejection of independent claims 111 and 140 and the claims that depend from them is in error for at least those reasons described below.

2. Brief Discussion of Frisch and Figie

Frisch discloses a variation of commonly known touch sensitive devices. Frisch discloses a touch sensitive device 10 that includes a frame member 12 that supports a top planar member 14 (see Illustration B below). The planar member 14 is configured with a plurality of slots 16 that define a plurality of spring portions 20 and an outer mounting ring 22 spaced peripherally around a touch surface 18. A plurality of capacitors 24 are disposed at the periphery of the touch surface 18 between the top planar member 14 and the frame member 12. The capacitors 24 include a first member 24a disposed on the bottom of the touch surface 18 and a second plate 24b disposed on or integral with the frame member 12. The capacitors 24 function as the "sensors" of the device 10. When a touch force is applied to the touch surface portion 18 of the top or planar member 14, the touch surface 18 moves relative to the frame 12. As the touch surface 18 moves, the distance between the capacitive plates 24a, 24b changes thus creating a change in capacitive value that can be measured and used to determine a location of the touch force applied to the touch surface 18.

The capacitors 24 disclosed by Frisch are flat plates (see Figures 1, 2A and 2B of Frisch). The capacitors 24 have no other structure besides the flat plates shown. Further, the plates 24a, 24b are intended to maintain the same size and shape so as to provide a consistent change in the capacitive value with a change in distance between the two plates. Further, it is clear from Frisch that the touch surface 18, being part of the top planar member 14, is a distinct and separate member from the capacitors 24. Thus, it would be improper to interpret any feature of the top planar member 14 as being part of the capacitors 24.

Frisch also discloses spring members 20 that perform those functions described above for springs of commonly known touch sensitive devices. The springs 20 allow the touch surface 18 move relative to the frame 12 while helping retain the touch surface 18 in a predetermined rest state/position. The only member or feature of the device 10 disclosed by Frisch that flexes or has any elastic properties is the spring members 20 and the connection point of those spring members 20 to the mounting ring 22 and the touch surface 18.

Illustration B: Figures 1, 2A and 2B of Frisch

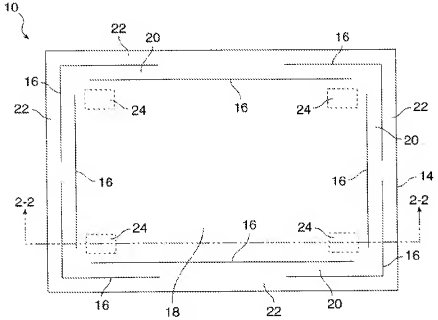

FIG. 1

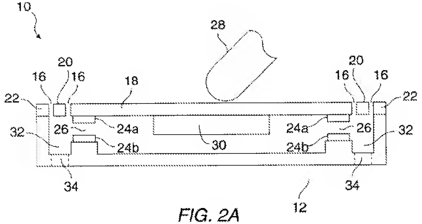

FIG. 2A

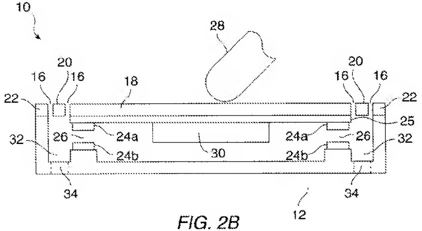

FIG. 2B

Figie discloses a switch matrix 10 that includes an outer membrane 12 and a rearward membrane 16 (see Illustration C below). Each membrane is constructed of a flexible, electrically insulating, transparent material. The insulating properties prohibit the membranes 12, 16 from functioning as a capacitive member. A plurality of contacts 14 are positioned on a rear surface of the membrane 12, and a plurality of contacts 18 are positioned on a front surface of the membrane 16 directly across from individual contacts 14. The membranes 12, 16 are arranged such that when a finger or stylus presses down upon the membrane 12, the membrane 12 is deformed to cause contact 14 to touch corresponding contact 18. When the contacts 14, 18 engage, a current flows therebetween to provide a switch function. The membranes 12, 16 remain separated by insulating spacers until the membrane 12 is engaged by a stylus/finger. The contacts 14, 18 doe not function as a capacitive structure, wherein a change in capacitance of the capacitive structure is monitored as part of a sensor device. The contacts 14, 18 are components of a switch element 26 that operates only upon engagement of the contacts 14, 18 to generate current flow.

Illustration C: Figure 1 of Figie

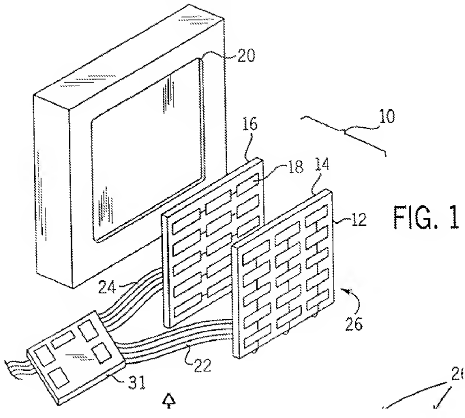

FIG. 1

3. Detailed Discussion Relative To Claims 111-164

The final rejection of claims 111-164 based on Frisch and Figie is improper insofar as Frisch fails to disclose the features recited in Appellant's claims and provides no teaching that would have suggested the desirability of modification to include such features. Moreover, Figie fails to provide any teaching that would have led a person of ordinary skill in the art to modify the teaching of Frisch to arrive at Appellant's claimed invention. For these reasons, some of which are further detailed below, the Examiner's rejections are clearly improper and without basis, and impart deficiency in the prima facie case the Examiner must make, as required by regulations.

Claims 111-164 are directed to a force sensor for sensing a touch force applied to a touch surface. As claimed, the force sensor is a separate subcomponent of a touch sensitive device that is defined without reference to other features of the touch sensitive device. The claimed force sensors include "a first capacitor plate at least a portion of which is an elastic element that allows the first capacitor plate to move" (claim 111) or "a first capacitor plate having an elastic element portion" (claim 140). The claimed force sensors also include a second capacitor plate, wherein transmission of at least part of the touch force through the elastic element contributes to a change in capacitance between the first capacitor plate and the second capacitor plate. In other force sensitive touch devices, including those disclosed by Frisch, the force sensors do not include elastic elements that are part of a capacitor plate. In fact, in the pending final rejection dated July 20, 2007, the Examiner agrees that Frisch does not disclose a first element (i.e., the capacitor plate 24a) having at least a portion that is an elastic element.

The membrane 12 disclosed by Figie is not an elastic element portion of a capacitor plate as the rejection contends. The membrane 12 is a flexible, insulating substrate that supports an electrical contact 14 of a switch element 26. By definition an insulating material does not have capacitive properties and therefore cannot be a portion of a capacitive plate. Furthermore, the membrane 12 is a separate and distinct structure from the contacts 14. There is no disclosure or suggestion in Figie that the membrane 12 is "a portion" of the contacts 14. Even if it were possible to have a insulative portion of a capacitive plate, which Appellant does not concede is possible, there is no teaching or motivation provided by Figie to create such a structure.

Therefore, Figie fails to remedy the deficiencies of Frisch, because the combination of Frisch and Figie fails to disclose or suggest "a first capacitor plate at least a portion of which is

an elastic element that allows the first capacitor plate to move" (claim 111) or "a first capacitor plate having an elastic element portion" (claim 140). Furthermore, one of ordinary skill in the art would find no motivation in Figie to modify the plates 24a, 24b of Frisch to include "an elastic element" or "an elastic element portion" that is part of the plate 24a, 24b, because Figie only teaches a membrane 12 that has insulative rather than conductive properties and that is a separate and distinct feature from the electrical contact (i.e., conductive member). Thus, neither Frisch nor Figie, alone or in combination, discloses or renders obvious every limitation of claims 111 and 140 and the claims that depend from them.

Further to the above, Frisch and Figie fail to disclose or suggest a first substantially planar element of a force sensor wherein "the elastic element portion defining an integral elevated feature of the first capacitor plate, the elastic element portion receiving at least part of the touch force into the first capacitor plate," as required by claim 140. The features in Frisch and Figie identified by the Examiner as being elastic features (i.e., the insulative membrane 12 in Figie) are not an integral part of a capacitive plate and are not an elevated feature of a capacitor plate. As discussed above, the membrane 12 is not integral with the electrical contacts 14, but is rather a separate and distinct piece. The contact 14 disclosed by Figie have no elevated features, much less a elastic element portion defining an integral elevated feature of a capacitor plate. Therefore, Frisch and Figie fail to disclose or suggest every limitation of claim 140 for this additional reason.

For at least these reasons, the Examiner has failed to establish a prima facie case of obviousness for Appellant's claims. In view of the above, Appellant submits that independent claims 111 and 140 and the claims that depend from them are allowable.

CONCLUSION

Appellant's claims 111-164 are patentable over the combination of Frisch and Figie for those reasons stated above. It is earnestly requested that the Examiner's rejections be reversed, and that all of the pending claims be allowed.

Please charge any additional fees or credit any overpayment to Deposit Account No. 13-3723.

Respectfully submitted,

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
(612) 332-5300

Date: February 4, 2008

By: /Joshua N. Randall/
Joshua N. Randall
Reg. No. 50,719

23552
PATENT TRADEMARK OFFICE

CLAIMS APPENDIX

1-110. (Canceled)

111. (Previously Presented) A force sensor for sensing a touch force applied to a touch surface, the force sensor comprising:

a first element including a first capacitor plate at least a portion of which is an elastic element that allows the first capacitor plate to move; and

a second element including a second capacitor plate opposed to the first capacitor plate;

wherein transmission of at least part of the touch force through the elastic element portion contributes to a change in capacitance between the first capacitor plate and the second capacitor plate.

112. (Previously Presented) The force sensor of claim 111, wherein the first element is substantially planar.

113. (Previously Presented) The force sensor of claim 111, wherein the first capacitor plate and the elastic element are formed as a single integral piece.

114. (Previously Presented) The force sensor of claim 113, wherein the elastic element defines an elevated feature of the first capacitor plate.

115. (Previously Presented) The force sensor of claim 114, wherein the elevated feature is located at the elastic center of the first element.

116. (Previously Presented) The force sensor of claim 111, further comprising force-receiving means for receiving at least part of the touch force into the first element.

117. (Previously Presented) The force sensor of claim 116, wherein the force-receiving means comprises the elastic element.

118. (Previously Presented) The force sensor of claim 116, wherein the force-receiving means comprises a feature formed into the first element.

119. (Previously Presented) The force sensor of claim 116, wherein the force-receiving means comprises an elevated feature of the first capacitor plate.

120. (Previously Presented) The force sensor of claim 116, wherein the touch surface is in communication with a region of a surface of the force-receiving means, and wherein the touch surface tends to remain in contact with the region of the surface of the force-receiving means when the position of the touch surface changes with respect to the force-receiving means.

121. (Previously Presented) The force sensor of claim 111, further comprising force transmission means for transmitting at least part of the touch force to at least one structure other than the first element.

122. (Previously Presented) The force sensor of claim 111:

wherein the second element comprises a planar support surface that includes a plurality of electrically conductive mechanical bearing contacts; and

wherein at least portions of the first capacitor plate are in contact with the plurality of mechanical bearing contacts to transmit force thereto.

123. (Previously Presented) The force sensor of claim 122, wherein the second capacitor plate includes a second capacitive surface that is coplanar with the plurality of mechanical bearing contacts.

124. (Previously Presented) The force sensor of claim 123, wherein the second capacitive surface and the plurality of mechanical bearing contacts are composed of the same substrate.

125. (Previously Presented) The force sensor of claim 122, wherein the planar support surface is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

126. (Previously Presented) The force sensor of claim 111, wherein the first and second capacitor plates are separated by a volume, and wherein the ratio of the height of the volume to the volume's greatest breadth is less than 0.05.

127. (Previously Presented) The force sensor of claim 111, further comprising force signal development means for developing a signal in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

128. (Previously Presented) The force sensor of claim 111, wherein the force sensor includes an axis of sensitivity that passes through the elastic center of the elastic element.

129. (Previously Presented) The force sensor of claim 111, further comprising the touch surface, wherein the touch surface is a touch surface of a handheld device.

130. (Previously Presented) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than one-fifth of the maximum distance between any two force sensors that are used in the touch location device to measure the touch force.

131. (Previously Presented) The force sensor of claim 111, wherein the first capacitor plate includes a first capacitive surface, and the smallest rectangular parallelepiped that encloses the first capacitive surface, the elastic element, and the second capacitor plate has a greatest dimension that is at least five times its least dimension.

132. (Previously Presented) The force sensor of claim 111, wherein the first capacitor plate includes a first capacitive surface and the second capacitor plate includes a second

capacitive surface, at least a portion of the first element being in contact with at least one support region of the second element to transmit force thereto, the second capacitive surface being substantially coplanar with the at least one support region.

133. (Previously Presented) The force sensor of claim 132, wherein the at least one support region is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

134. (Previously Presented) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than four times the maximum dimension of the volume of the capacitive gap.

135. (Previously Presented) The force sensor of claim 134, wherein the second capacitor plate is separated from the first capacitor plate in the unloaded state of the force sensor by not more than 10 mils.

136. (Previously Presented) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the aggregate normal component of the mechanical path defining the capacitive gap being no greater than twice the size of the capacitive gap.

137. (Previously Presented) The force sensor of claim 136, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

138. (Previously Presented) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

139. (Previously Presented) The force sensor of claim 111, wherein the force sensor has a normal stiffness not less than 0.5 pounds per mil.

140. (Previously Presented) A force sensor for sensing a touch force applied to a touch surface, the force sensor comprising:

a first capacitor plate having an elastic element portion, the elastic element portion defining an integral elevated feature of the first capacitor plate, the elastic element portion receiving at least part of the touch force into the first capacitor plate; and

a second capacitor plate opposed to the first capacitor plate;

wherein transmission of at least part of the touch force through the elastic element portion contributes to a change in capacitance between the first capacitor plate and the second capacitor plate.

141. (Previously Presented) The force sensor of claim 140, wherein the first capacitor plate is substantially planar.

142. (Previously Presented) The force sensor of claim 140, wherein the elevated feature is located at the elastic center of the first capacitor plate.

143. (Previously Presented) The force sensor of claim 140, further comprising force-receiving means for receiving at least part of the touch force into the first capacitor plate.

144. (Previously Presented) The force sensor of claim 143, wherein the force-receiving means comprises the elastic element portion.

145. (Previously Presented) The force sensor of claim 143, wherein the touch surface is in communication with a region of a surface of the force-receiving means, and wherein the touch surface tends to remain in contact with the region of the surface of the force-receiving means when the position of the touch surface changes with respect to the force-receiving means.

146. (Previously Presented) The force sensor of claim 140, further comprising force transmission means for transmitting at least part of the touch force to at least one structure other than the first capacitor plate.

147. (Previously Presented) The force sensor of claim 140:

wherein the second capacitor plate comprises a planar support surface that includes a plurality of electrically conductive mechanical bearing contacts; and

wherein at least portions of the first capacitor plate are in contact with the plurality of mechanical bearing contacts to transmit force thereto.

148. (Previously Presented) The force sensor of claim 147, wherein the second capacitor plate includes a second capacitive surface that is coplanar with the plurality of mechanical bearing contacts.

149. (Previously Presented) The force sensor of claim 148, wherein the second capacitive surface and the plurality of mechanical bearing contacts are composed of the same substrate.

150. (Previously Presented) The force sensor of claim 147, wherein the planar support surface is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

151. (Previously Presented) The force sensor of claim 140, wherein the first and second capacitor plates are separated by a volume, and wherein the ratio of the height of the volume to the volume's greatest breadth is less than 0.05.

152. (Previously Presented) The force sensor of claim 140, further comprising force signal development means for developing a signal in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

153. (Previously Presented) The force sensor of claim 140, wherein the force sensor includes an axis of sensitivity that passes through the elastic center of the elastic element portion.

154. (Previously Presented) The force sensor of claim 140, further comprising the touch surface, wherein the touch surface is a touch surface of a handheld device.

155. (Previously Presented) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than one-fifth of the maximum distance between any two force sensors that are used in the touch location device to measure the touch force.

156. (Previously Presented) The force sensor of claim 140, wherein the first capacitor plate includes a first capacitive surface, and the smallest rectangular parallelepiped that encloses the first capacitive surface, the elastic element portion, and the second capacitor plate has a greatest dimension that is at least five times its least dimension.

157. (Previously Presented) The force sensor of claim 140, wherein the first capacitor plate includes a first capacitive surface and the second capacitor plate includes a second capacitive surface, at least a portion of the first capacitor plate being in contact with at least one support region of the second capacitor plate to transmit force thereto, the second capacitive surface being substantially coplanar with the at least one support region.

158. (Previously Presented) The force sensor of claim 157, wherein the at least one support region is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

159. (Previously Presented) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than four times the maximum dimension of the volume of the capacitive gap.

160. (Previously Presented) The force sensor of claim 159, wherein the second capacitor plate is separated from the first capacitor plate in the unloaded state of the force sensor by not more than 10 mils.

161. (Previously Presented) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the aggregate normal component of the mechanical path defining the capacitive gap being no greater than twice the size of the capacitive gap.

162. (Previously Presented) The force sensor of claim 161, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

163. (Previously Presented) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

164. (Previously Presented) The force sensor of claim 140, wherein the force sensor has a normal stiffness not less than 0.5 pounds per mil.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.